Comprehensive Everglades Restoration Plan
Formulation and Evaluation Procedures

The purpose of this plan formulation and evaluation guidance is to provide direction to the Project Delivery Teams (PDTs) for plan formulation and evaluation of individual CERP projects. This guidance supplements current planning guidance regulation (ER 1105-2-100) published by the US Army Corps of Engineers (22 April 2000). The iterative nature of the planning process coupled with the magnitude and complexity of the Comprehensive Plan requires a sound scientific and planning methodology applied with reason and flexibility to address a broad range of ecologic, economic and decision-making issues. As such, this paper provides guidance rather than dictum for formulating and evaluating individual CERP projects. Variations from this guidance may be discussed and deemed necessary as determined during policy review meetings. Specific variations, as justified by the Project Delivery Team with the support of RECOVER, will be addressed in individual Project Guidance Memorandums.

Background

The "Central and Southern Florida Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement" (April 1999 Final Feasibility Report) recommends a comprehensive plan for the water resources of central and southern Florida. The overarching objective of this plan, known as the Comprehensive Everglades Restoration Plan (CERP), is the restoration, preservation, and protection of the South Florida ecosystem while providing for the other water-related needs of the region. The goal for individual CERP projects is to synergistically optimize the performance of the Plan by refining the design and operation of components such that the system-wide performance of the Comprehensive Plan equals or exceeds the performance of the Comprehensive Plan recommended by the Restudy[1] in a cost effective manner.

The Restudy

The Comprehensive Everglades Restoration Plan was formulated to achieve ecological restoration of the greater Everglades ecosystem while providing for other water resources needs of the region. Initial screening efforts revealed a pressing need to capture more water in south Florida to restore the Everglades, protect the estuaries, and to provide adequate water supply for urban and agricultural needs in the future. During the screening phase of the Restudy, hydrologic computer modeling was combined with an economic "best buy" approach to reduce the number of potential components. This provided a range of cost-effective components to

[1] The Comprehensive Everglades Restoration Plan contained in the "Final Integrated Feasibility Report and Programmatic Environmental Impact Statement", prepared by the U.S. Army Corps of Engineers and the South Florida Water Management District, 1999.

capture, store and convey water to the right parts of the system at the right time. These components were then combined to form "comprehensive" alternative plans that were evaluated in a regional or system-wide context. It is the synergistic effect of these components that achieve the goals and objectives of the Comprehensive Plan.

Due to the size and complexity, implementation of the CERP requires that it be divided into smaller packages of components that are referred to as projects. The sequencing of these projects was based on a complex array of guidelines and rules ranging from funding and manpower resources to physical dependencies between the projects and tasks[2]. Ideally, the sequencing would have been based solely on the economic efficiencies of the projects. For example, the first project to be constructed would be the project that provides the greatest net benefits. However, although a key rule in the CERP project scheduling is to implement projects that provide significant early system-wide benefits, the other sequencing factors impact the ability to implement the plan in the most economically efficient manner. Issues pertaining to construction sequencing, connectivity, and potential for early restoration benefits will continue to be addressed through the monitoring and adaptive assessment strategies.

The Water Resources Development Act of 2000 approved the Comprehensive Plan contained in the "Final Integrated Feasibility Report and Programmatic Environmental Impact Statement" dated April 1, 1999. This plan will be modified periodically to more effectively and precisely achieve the goals and objectives of the plan. These modifications and refinements will be achieved through Project Implementation Reports and system-wide monitoring and assessment strategies[3]. These efforts support the goal to systematically improve the Comprehensive Plan based on new information and will result in future updates of the "approved" Plan.

Project Implementation Reports

The goal of the plan formulation and evaluation activities conducted for the Project Implementation Report is to reasonably maximize the project's contribution toward the system-wide benefits of CERP compared to cost. Alternative projects will be formulated to better define, refine, and/or optimize projects and/or to investigate more cost-effective ways to achieve the same or greater benefits at a lesser cost compared to that predicted for the recommended plan identified by the Restudy. In addition, the evaluation process will identify local impacts and interim operation strategies. The Project Implementation Report (PIR) will contain a description of the plan formulation and evaluation process as required in Section 601 of the Water Resources Development Act of 2000[4].

[2] This topic is more fully discussed in Section 10 of The Comprehensive Everglades Restoration Plan contained in the "Final Integrated Feasibility Report and Programmatic Environmental Impact Statement", prepared by the U.S. Army Corps of Engineers and the South Florida Water Management District, 1999.
[3] Guidance for the Adaptive Assessment and Monitoring will be provided under separate memoranda.
[4] Guidance for Project Implementation Reports will be provided under separate memoranda.

Applicability

The formulation and evaluation procedures described in this paper apply to CERP projects that are hydrologically linked and provide system-wide benefits. The projects that meet this criterion are displayed in **Appendix A** of this paper. Some of the projects formulated in the Comprehensive Plan were outside the boundary of the regional computer models and/or did not register impacts that could be captured given the scale of these simulation models. These projects will be formulated and evaluated consistent with traditional methods applied to individual projects rather than the systems formulation procedure contained in this guidance.

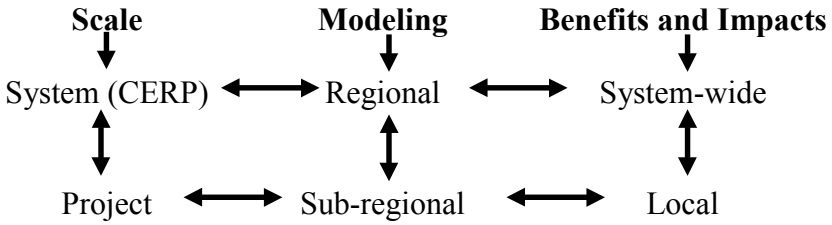
Terminology

Plan formulation and evaluation activities encompass a range of alternatives at various levels of analysis. To better understand these various levels and the base-conditions that apply, consistent terminology has been developed to define what is meant by system-wide versus project-level evaluations. Other terms are defined in **Appendix B** of this paper.

System-wide and Project-level Analysis

The benefit and impact analyses conducted for each CERP project will be accomplished at both the local and system-wide scale. For example, a reservoir project could have adverse impacts to wetlands within the footprint of the project while the storage function of the reservoir (in combination with other CERP features) could have significant ecologic benefits by restoring sheetflow across vast areas of the Everglades and downstream estuaries. The impacted wetlands will be considered a "local" effect, while the ecological benefits to the Everglades and downstream estuaries will be considered "system-wide" effects. Regional models will be used to assess impacts to sheetflow and estuaries, while sub-regional models will be used to assess impacts to the footprint and in the vicinity of the project.

System and Project Terms



This document provides working level guidance to assist PDTs in the implementation of CERP. The guidance does not constitute policy nor does it create authority beyond that granted to any agency member carrying out their duties. Guidance reflecting agency policy on subjects listed in the programmatic regulations for CERP will be issued when the final regulations are adopted.

Plan Formulation and Evaluation Procedure

The formulation and evaluation approach proposed in this paper considers the system-wide interdependencies of the hydrologically linked CERP projects. This formulation and evaluation procedure includes four steps: 1) system formulation and evaluation 2) interim project assessment, 3) identification of selected alternative, and 4) assessment of the incremental benefits and costs attributable to the project.

The system formulation and evaluation and interim project assessment activities will address system-wide and local effects as well as interim impacts. The projects will be formulated to optimize system-wide benefits and costs while ensuring beneficial, although not necessarily optimal, local and interim impacts. Identification of the selected plan should be based on the projects contribution to system-wide goals and purposes of the plan with consideration of the interim goals and targets.

Quantification and qualification of benefits will be conducted at the project (local) and regional (system-wide) levels. Local, project-specific benefits include those benefits achieved by the project independent of other CERP features. System-wide impacts include those impacts that are achieved synergistically by two or more CERP projects. Interdependent benefits will be measured from a regional perspective. Regional evaluations of interdependent and cumulative benefits will confirm and apportion mutual benefits to individual projects.

Achieving the system-wide goals and objectives of the Comprehensive Plan requires synergistic performance of project components. Interdependent benefits will be evaluated regionally to avoid overestimation and/or duplication of benefits. As the focus of PIR evaluations is the system-wide impacts resulting from the project, PIRs will include all project-related benefits with an emphasis on those that are achieved synergistically with other project components. To ensure accurate estimation of cumulative effects, those impacts resulting from the synergy of two or more CERP projects will be evaluated regionally. Generally, system-wide evaluations will fall under the purview of the RECOVER team, while the local impacts will be evaluated by the individual PDTs

Evaluations of National Economic Development (NED) and National Ecosystem Restoration (NER) benefits will be consistent with the Principles and Guidelines, ER 1105-2-100. Where applicable, economic impacts realized by alternative projects will be identified, measured, and quantified to the extent practical and to a level commensurate with the level of investment and significance of the benefits. Ecosystem impacts realized by the alternative projects will also be quantified to the extent practical. The U.S. Army Corps of Engineers ecosystem restoration studies typically measure ecosystem benefits in terms of resources/ physical dimensions (number of acres of wetlands, for example), or population counts (number of wading birds for example), or various habitat-based scores ("habitat units" based on the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures, or "HEP", for example). Any of these metrics may be used in conducting cost-effectiveness and incremental cost analyses. The evaluation of effects will be conducted by assessing the differences between the with- and without-project condition.

Step 1: System Formulation and Evaluation

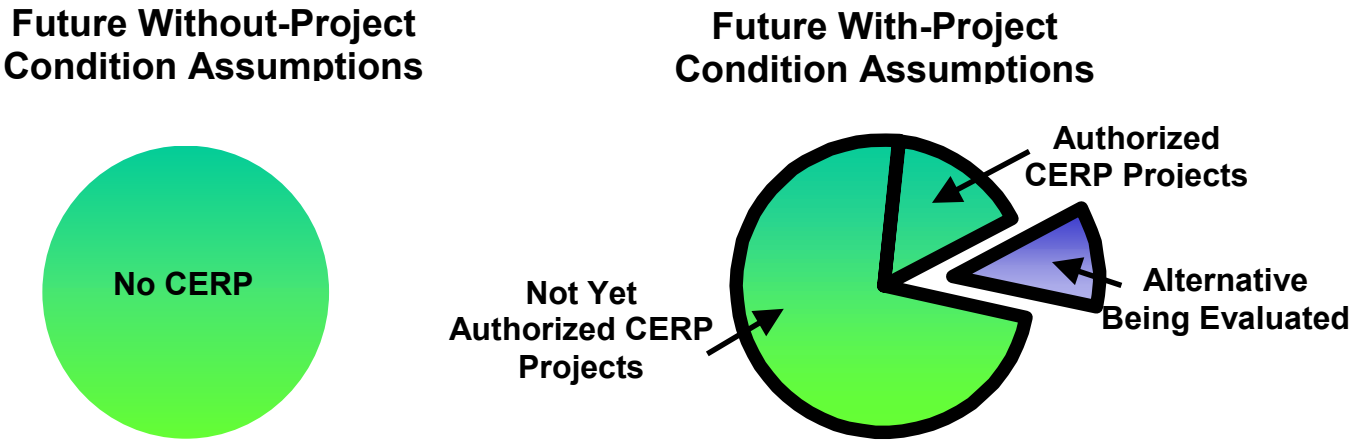
The individual projects that make up the approved Comprehensive Plan were selected based on their synergistic effect to the overall plan. The purpose of this first step is to formulate alternative projects to optimize system-wide benefits while addressing local impacts. Therefore, the objectives of each project will be consistent with the objectives established in the approved Comprehensive Plan. This first step formulates a project alternative that maximizes the achievement of local and system-wide goals and objectives of the Comprehensive Plan by considering various ranges and configurations of the project under consideration.

The formulation portion of this procedure will result in a range of alternative project plans that include structural and nonstructural measures. The PDT is responsible for the development of these various alternatives to include different measures, components, features, and project scales within the study area. Projects being evaluated will proceed through increasingly rigorous levels of analysis beginning with conceptual evaluations of completeness, acceptability, effectiveness, and efficiency and progressing to more detailed comparisons involving estimation of project effects using computer simulations and estimation of project costs. The initial alternative to be considered by the PDT will be the components of the project defined by the approved Comprehensive Plan. While new information and implementation of other CERP components may show that this is an unrealistic alternative for consideration, evaluation of this alternative is required to demonstrate the differences between the approved Comprehensive Plan and the alternatives being evaluated.

The evaluation of these alternative projects requires an analysis of system-wide and project-level outputs for each of the alternatives considered. All benefits are 'system-wide' in that they constitute improvements to the South Florida ecosystem. The distinction lies in the independence versus interdependence of benefits and impacts: system-wide outputs are those outputs that are achieved synergistically and are interdependent with other CERP features. Project-level, local benefits are those benefits that are achieved independent of other CERP features. Costs and benefits of the future with-project condition will be based on current price levels for the authorized and not yet authorized CERP projects. The alternatives evaluated may increase or decrease the costs and/or benefits of the total CERP plan.

The evaluation of these alternatives involves the comparison of the future with-project against the future without-project. For planning purposes, the future with-project condition (shown in **Figure 1**) will be a combination of authorized CERP projects, not yet authorized CERP projects included in the Comprehensive Plan, and the project being evaluated in the PIR. The without – project condition will assume no CERP features are in place. The future without-project condition is synonymous with the no-action alternative.

FIGURE 1
Step 1 – System Benefits
Future Condition Assumptions

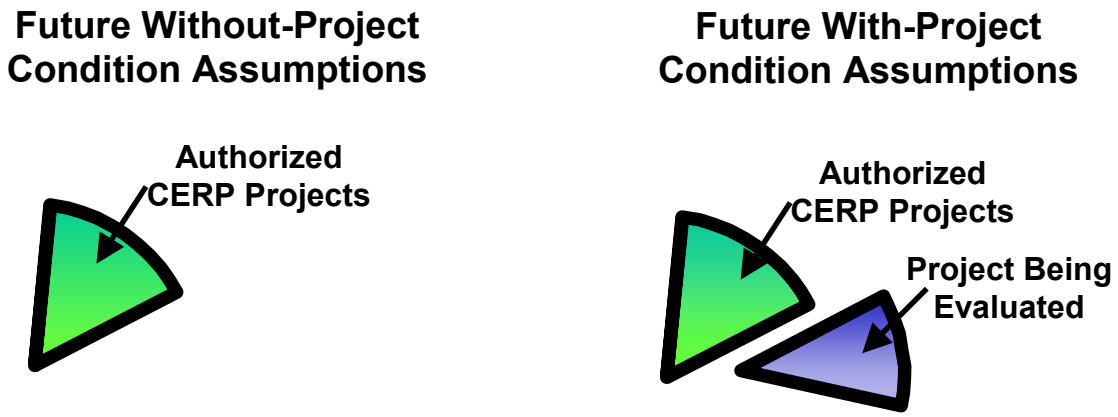


Step 2: Interim Project Assessment

An interim project assessment will be conducted for the purposes of evaluating the project's contribution toward achieving interim goals and targets for water related needs, determining appropriate sequencing of the project, and evaluating interim impacts attributable to the project independent of CERP projects not yet implemented. During this step of the evaluation process, baseline conditions are determined; operational strategies are developed, and interim impacts are assessed for each of the alternative plan. This interim project assessment is conducted to formulate alternative interim operational strategies and to evaluate interim effects of the alternative plans. This assessment addresses the construction phasing, operational strategies, and resulting effects attributable to the alternative plans. This step addresses potential interim adjustments in operations and/or to the project formulated in step 1 that may be justified until additional CERP projects are implemented.

Project alternatives will be evaluated using a next-added incremental approach that compares system-wide performance of authorized CERP projects to system-wide performance of alternatives under consideration (see **Figure 2**). This step may identify project components that can be deferred until other CERP projects are on line; at what point in time any deferred components should be implemented; and what temporary features may be necessary for a project to function during interim operations. For example, projects that have been identified for phased implementation could be considered for deferment if the interim operations assessment identifies potential adverse impacts or dysfunctional operations.

FIGURE 2
Step 2 – Interim Project Assessment
Future Condition Assumptions



The future with-project condition assesses the performance and impacts of the alternative plans and the implemented CERP projects. Evaluating the output of the alternatives together with authorized projects provides an assessment of local and system-wide impacts due to interim operations. The interim performance of the authorized projects and the alternative plans (developed in step 1) will be compared to the appropriate CERP baseline condition. Establishing this baseline condition for implementation of the alternatives under consideration will enable the PDTs to develop realistic operational strategies and more accurately determine potential interim effects.

The baseline condition will be defined using 5-year intervals to accurately reflect construction and operation of authorized CERP projects. Thus, the baseline condition for the various projects will differ over time to reflect the project implementation schedule for the CERP. The initial base year is 2010 and includes authorized CERP projects. Projects that are not scheduled for construction completion by this time will be considered in the subsequent 5-year period. For example, for a project scheduled for construction in 2012, the interim project evaluation would consider 2015 for its interim future condition.

Step 3: Identification of Selected Alternative

A ***tentatively selected plan*** will be identified based on the results of the analyses conducted in Steps 1 and 2 above. This alternative should be justified based on the projects contributions to both the system-wide goals and purposes of the Plan and the interim goals and targets. If the alternative cannot be justified based on its contribution to meeting interim goals and targets, it should be justified based on sequencing factors, dependency of other CERP projects on its completion, and/or operations considerations.

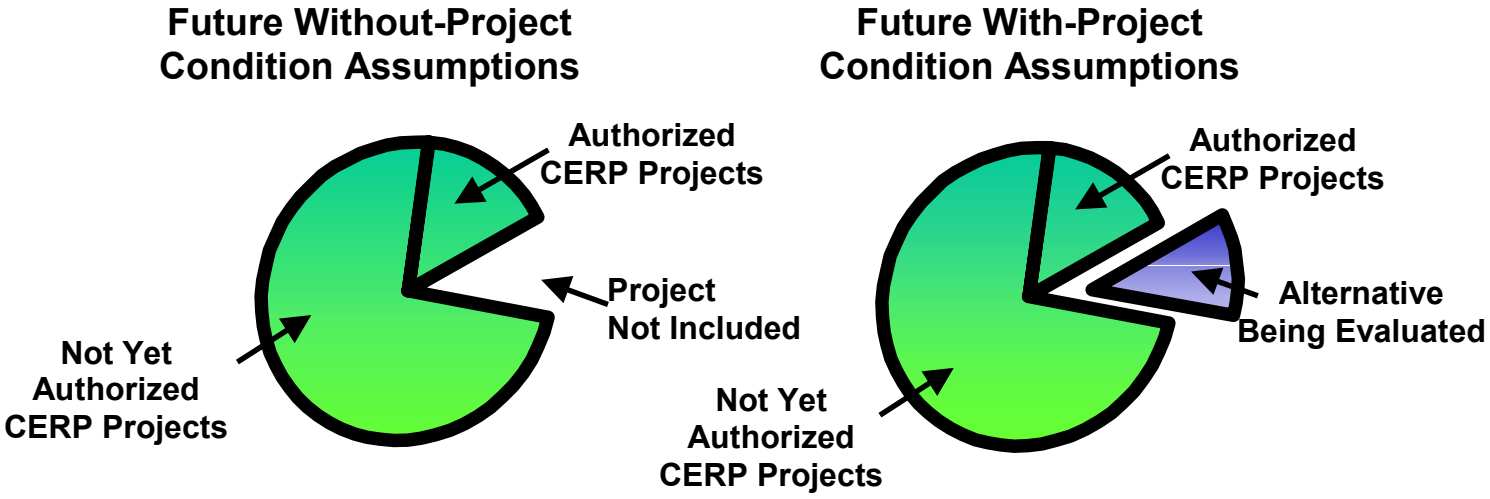
Traditionally, projects are selected based on project-level investments, output, and impacts. However, this plan selection step applies to projects that are hydrologically linked and operate optimally in a synergistic fashion. As a result of the interdependencies among projects, some benefits may not be realized until other CERP projects are implemented. The project that most efficiently accomplishes the system-wide goals and purposes of the plan will be selected despite this potential lag in benefit achievement.

Interim impacts will be assessed at both the system-wide and local levels to identify all impacts and to assist in evaluating the full range of benefits and impacts attributable to project alternatives. Interim impacts will be considered for project justification and may identify short-term operational strategies to maximize short-term system-wide performance. Project selection will emphasize system-wide achievement and sustainability of benefits.

Step 4: Assessing Incremental Benefits and Costs Attributable to the Project

The final step is an assessment of the project's contribution to the system-wide benefits and costs. The purpose of this assessment is to quantify and describe the incremental costs and benefits of the selected PIR in operation with the rest of CERP. In essence, removing the project under consideration from the future with-project condition and measuring the system loss will capture the incremental benefits attributable to the proposed project. This evaluation illustrates the incremental contribution of the project. The main difference between this step and step 1 is the without-project condition. In step 1, the without-project condition is "no CERP," whereas in this step, the without-project condition assumes that all of CERP is in place (authorized and unauthorized projects) with the exception of the ***tentatively selected project***. As such, the costs and benefits are incremental to the total CERP project. This is a last-added incremental evaluation technique.

FIGURE 3
Step 4 – Incremental Benefits
Future Condition Assumptions



The future with-project condition includes the output of authorized and unauthorized CERP projects (as defined by the approved Plan) with the project under consideration (this condition includes the same assumptions as the future with-project conditions of Step 1). The difference between the future with- and without- project conditions, as shown in **Figure 3**, represents the project's contribution to system-wide output.

APPENDIX A

WBS	PROJECT NAME	RESTUDY COMPONENT	FORMULATION AND EVALUATION PROCEDURE APPLIES
01	Lake Okeechobee Watershed	A, W, LOWQTF, LOTSD	✓
02	Lake Istokpoga Regulation Schedule	OPE	
03	Lake Okeechobee Aquifer Storage & Recovery	GG	✓
04	C-43 Basin Storage Reservoir - Part 1	D P1	✓
05	C-43 Basin Aquifer Storage & Recovery - Part 2	D P2	✓
06	Caloosahatchee Backpumping With Stormwater Treatment	DDD	✓
07	Indian River Lagoon	B, UU	✓
08	Everglades Agricultural Area Storage Reservoirs - Phase 1	G P1	✓
09	Everglades Agricultural Area Storage Reservoirs - Phase 2	G P2	✓
10	Big Cypress / L-28 Interceptor Modifications	CCC	✓
11	Flow To NW & Central WCA 3A	II, RR	✓
12	WCA 3 Decomp & Sheetflow Enhancement - Part 1	QQ P1, SS P2	✓
13	WCA 3 Decomp & Sheetflow Enhancement - Part 2	AA, QQ P2	✓
14	Loxahatchee National Wildlife Refuge Internal Canal Structures	KK	✓
15	Modify Holey Land Wildlife Management Area Operation Plan	DDD	✓
16	Modify Rotenberger Wildlife Management Area Operation Plan	EE	✓
17	North Palm Beach County - Part 1	X, Y, GGG, Pal-Mar, LWL, K P1	✓
18	North Palm Beach County - Part 2	K P2, LL	✓
19	*Reserved For Future Use*		
20	PBC Agriculture Reserve Reservoir - Part 1	VV P1	✓
21	PBC Agriculture Reserve Aquifer Storage & Recovery - Part 2	VV P2	✓
22	Hillsboro Aquifer Storage & Recovery - Part 2	M P2	✓
23	Diverting WCA To CLB To Downstream Natural Areas	EEE, YY P2, ZZ	✓
24	Broward Co. Secondary Canal System	CC	✓
25	North Lake Belt Storage Area	XX P2	✓
26	Central Lake Belt Storage	S	✓
27	Everglades National Park Seepage Management	V, FF	✓

WBS	PROJECT NAME	RESTUDY COMPONENT	FORMULATION AND EVALUATION PROCEDURE APPLIES
28	Biscayne Bay Coastal Wetlands	FFF/OPE	✓
29	C-111 Spreader Canal	WW	✓
30	Southern Golden Gate Estates Hydrologic Restoration	OPE	
31	Florida Keys Tidal Restoration	OPE	
32	Lake Okeechobee ASR Pilot	Pilot	
33	Caloosahatchee (C-43) River ASR Pilot	Pilot	
34	Hillsboro ASR Pilot	Pilot	
35	Lake Belt In-Ground Reservoir Technology Pilot	Pilot	
36	L-31N Seepage Management Pilot	Pilot	
37	Wastewater Reuse Technology Pilot	Pilot	
38	Acme Basin B Discharge	OPE	✓
39	Strazulla Wetlands	OPE	
40	Site 1 Impoundment	M P1	✓
41	Broward County WPA	O, Q, SS P1, R, YY P1, ZZ	✓
42	Dade-Broward Levee & Canal	BB, T, S P1, XX P1	✓
43	Bird Drive Recharge Area	U	✓
44	ASR Regional Study	N/A	
45-89	Reserved For Future Use		
90	Miccosukee Water Management Plan	OPE	
91	Winsberg Farms Wetland Restoration	OPE	
92	Restoration Of Pineland & Hardwood Hammocks In C-111 Basin	OPE	
93	Henderson Creek / Belle Meade Restoration	OPE	
94	Lakes Park Restoration	OPE	
95	Melaleuca Eradication And Other Exotic Plants	OPE	
96	Seminole Tribe Big Cypress Reservation Water Conservation Plan	OPE	
97	West Miami-Dade Reuse	HHH	✓
98	South Miami-Dade Reuse	BBB	✓

Appendix B: Glossary of Terms and Acronyms

Activity – A specific project task that requires resources and time to complete.

Adaptive Assessment – A process for learning and incorporating new information into the planning and evaluation phases of the restoration program. This process ensures that the scientific information produced for this effort is converted into products that are continuously used in management decision making.

Authorization – An act by the Congress of the United States which authorizes use of public funds to carry out a prescribed action.

Central and Southern Florida Project – A multi-purpose project, first authorized by Congress in 1948, which provides flood control, water supply protection, water quality protection and natural resource protection.

Composition—includes different materials and methods that would accomplish the same purpose.

Comprehensive Everglades Restoration Plan [CERP] – The plan for the restoration of the greater Everglades and to meet water supply and flood protection needs in the urban and agricultural regions of south Florida.

Comprehensive Plan – The Comprehensive Everglades Restoration Plan, also known as the Yellow Book (the document had a yellow cover).

Ecosystem – An ecological community together with its environment, functioning as a unit.

Effectiveness – The degree to which the objectives of the Plan are accomplished.

Efficiency – The degree to which a plan is most cost-effective in achieving the objectives of the Plan.

Effort – The amount of work or labor, in hours or workdays, required to complete a task; effort is used to establish the labor costs associated with a project.

Evaluate – To appraise or determine the value of information, options or resources being provided to a project.

Feasibility Study – The second phase of a project whose purpose is to describe and evaluate alternative plans and fully describe a recommended project.

Goal – Something to be achieved. Goals can be established for outcomes (results) or outputs (efforts).

Local – refers to project-level activities, impacts and benefits.

Location—includes different sites for the same solution.

Model – A way of looking at reality, usually for the purpose of abstracting and simplifying it to make it understandable in a particular context; this may be a plan to describe how a project will be completed, or a tool to mathematically represent a process which could be based upon empirical or mathematical functions.

Objective – A goal expressed in specific, directly measurable terms.

Outcome – An end result. For purposes of the CERP, a quality of the restored south Florida ecosystem.

Output – Levels of work and effort. For purposes of the CERP, the products or services produced by a project or program.

Performance Measure – A desired result stated in quantifiable terms to allow for an assessment of how well the desired result has been achieved.

Physical properties—include sizes, amounts, counts, and the like. For example, the size of a site (30 acres, 40 acres, 50 acres), the number of plantings per acre, the percent canopy cover of vegetation, water depth, and discharge capacity of a pump are examples of physical properties of a plan or measure that can have different scales.

Plan – The term "Plan" means the Comprehensive Everglades Restoration Plan contained in the "Final Integrated Feasibility Report and Programmatic Environmental Impact Statement", dated April 1, 1999, as modified by this section.

Project – A sequence of tasks with a beginning and an end that uses time and resources to produce specific results. Each project has a specific, desired outcome, a deadline or target completion date and a budget that limits the amount of resources that can be used to complete the project.

Project Delivery Team [PDT] – An interdisciplinary group formed from the resources of the implementing agencies, which develops the products necessary to deliver the project.

Region – refers to the CERP sytem. Regional models will evaluate the system-wide impacts for the CERP.

Restoration – The recovery of a natural system's vitality and biological and hydrological integrity to the extent that the health and ecological functions are self-sustaining over time.

Restoration Coordination and Verification [RECOVER] – A program-level activity whose role is to organize and apply scientific and technical information in ways that are most effective in supporting the objectives of the Comprehensive Everglades Restoration Plan.

Restudy – The Central and South Florida Project Comprehensive Review Study, authroized by the Water Resources Development Act of 1992, which examined the Central and Southern Project to determine the feasibility of modifying the project to restore the south Florida ecosystem and provide for other water-related needs of the region, and which resulted in The Final Integrated Feasibility Report and Programmatic Environmental Impact Statement, which was transmitted to Congress on July 1, 1999.

Risk Analysis – An evaluation of the feasibility or probability that the outcome of a project or policy will be the desired one; usually conducted to compare alternative scenarios, action plans or policies.

Scales—Scales are most typically thought of as different "sizes" of a plan, but they also apply to other plan dimensions. Several different properties of a management measure may be scaled. These include its physical properties, its composition, its location, and its timing and duration.

Scope – The magnitude of the effort required to complete a project.

Scoping – The process of defining the scope of a study, primarily with respect to the issues, geographic area and alternatives to be considered.

South Florida Ecosystem – An area consisting of the lands and waters within the boundary of the South Florida Water Management District, including the Everglades, the Florida Keys and the contiguous near-shore coastal waters of South Florida [also shown under Greater Everglades Ecosystem].

Stakeholders – People or organizations having a personal or enterprise interest in the results of a project, who may or may not be involved in completing the actual work on that project.

Sub-regional – Refers to the local modeling efforts designed to evaluate project-level outputs, impacts and benefits.

System – Refers to all components and features of the CERP.

Timing and duration—include different start and stop times or durantions for the same solution.

Trade-Off – Allowing one aspect of a project to change, usually for the worse, in return for another aspect of the project getting better.